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March 20, 2006

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APPLICATION NUMBER: ***60/661,750***
FILING DATE: ***March 15, 2005***

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS ***US60/661,750***

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031505

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)		
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[ ] *Additional inventors are being named on the ___separately numbered sheets attached hereto.*

TITLE OF THE INVENTION (280 characters max)

NON-CONTACT FEED FOR INTERNAL ANTENNA

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

[ ] Customer Number [ ] → *Place Customer Number Bar Code Label here*

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ENCLOSED APPLICATION PARTS *(check all that apply)*

[X] Specification (includes drawings) *Number of Pages* 3 [ ] CD(s), Number

[ ] Drawing(s) *Number of sheets* [ ] Other (specify)

[ ] Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)

[ ] Applicant claims small entity status. See 37 CFR 1.27.

[X] A check or money order is enclosed to cover the filing fees

[X] The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 01-0035

FILING FEE AMOUNT ($): $200.00

[ ] Payment by credit card. Form PTO-2038 is attached.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

[X] No.

[ ] Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE Jay S. Cinamon

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Date March 15, 2005

REGISTRATION NO. (if appropriate) 24,156

Docket Number: 206,915

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

STATEMENT OF FILING BY EXPRESS MAIL 37 C.F.R. § 1.10

This correspondence is being deposit with the United States Postal Service on March 15, 2005 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number ER 842 050 588 US addressed to the Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450.

PROVISIONAL APPLICATION COVER SHEET
Additional Page

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Docket Number	206,915	Type a plus sign (+) inside this box →	+

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Number 2 of 2

SPECIFICATION

A. **Title/Subject Matter of the Invention**: Non-contact feed for internal antenna

B. **Persons Who Contributed to or Worked on the Invention:** Charlie (Eun-gyu) Bae, Haim Yona and Snir Azulay.

C. **Purpose of the invention:** To create a small, high efficiency, cost effective internal antenna with broadband coverage. The antenna would perform well in single as well as multi-band implementations.

D. **A summary of invention: How does the present invention solve the problem; what are the differences between this solution and the prior solutions; and what are the advantages provided by the invention:**

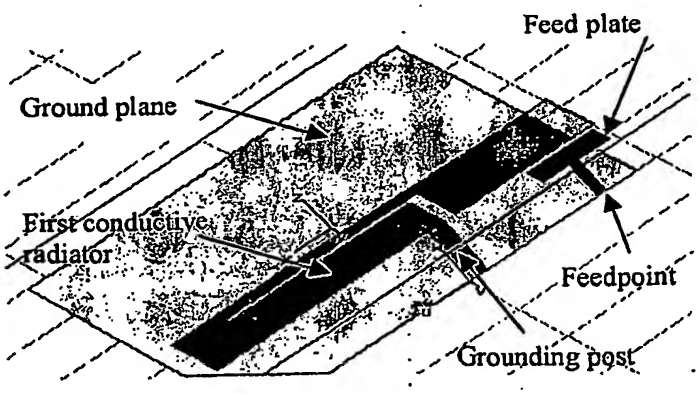
Multi-band Inverted F Antennas (IFA, PIFA etc) designs tend to be physically large and lack sufficient bandwidth, especially in the low bands. Folded Monopole Antennas (FMA) have high efficiency even in small multi-band designs, but also lack sufficient bandwidth. Dielectrically excited antennas solves the size and bandwidth issues, but at a significant cost due to expensive dielectric components.

U.S. Patent 5,434,579 (Kagoshima et al) describes a non-contact feeding structure for a PIFA, using a dielectric substrate between the ground plane and capacitive feeding plate. The size of the capacitive plate is used for impedance matching.

In the invention described here, we use a variation of the capacitive feeding structure to create a broadband antenna that does not necessarily include a ground plane beneath the radiating element. Further, improved specific band response can be obtained by using radiating slots in the conductive element.

This inventions' capacitive feeding structure does NOT require a dielectric substrate between it and the ground-plane. We call it a Simple Capacitive Feed (SCF)

E. **Description of the invention**



The antenna consists of a first conductive radiating element generally located above a conductive ground plane, but not necessarily fully overlapping with the ground plane. A grounding post connecting the first conductive radiating element to the ground plane.

A feed plate element placed between the first conductive radiating element and ground plane connected directly to the feedpoint of the device for the purpose of capacitively feeding the first conductive radiating element. There is no need for a dielectric substrate between the feed plate element and the ground plane or the first conductive radiating element, though one can be used to reduce the physical size. The size of the feed plate element and its distance to the first conductive radiating element can be changed to give correct impedence matching. Choice of material in between the feed plate element and the first conductive radiating element also affect the capacitive feeding structure created.

Implementation of first conductive radiating element may or may not utilize radiating and tuning slots.

First possible implementation is a "loop" antenna where the SCF capacitive feed is on one end of the first conductive radiating element, the ground post is on the far end of the first conductive radiating element, with the loop bending parallel to itself creating a slot that also radiate at specific bands. The ground plane may or may not be fully parallel to and beneath the first conductive radiating element. The first conductive radiating element may or may not include tuning flaps

Second possible implementation utilizes a more traditional Planar structure where the SCF capacitive feed and the grounding post are located near each other. The implementation may or may not include radiating and tuning slots or tuning flaps, and may or may not have a ground plane fully beneath the first conductive elment.

F. **Differences Between Invention and Other Systems or Methods:**

In the invention described here, we use a variation of the capacitive feeding structure to create a broadband antenna that does not necessarily include a ground plane beneath the radiating element. Further, improved specific band response can be obtained by using radiating slots in the conductive element.

This inventions' capacitive feeding structure does NOT require a dielectric substrate between it and the ground-plane. We call it a Simple Capacitive Feed (SCF).

One embodiment of the invention, in contrast to the standard PIFA and/or prior art antennas, feeds the antenna at the point of high impedance. The benefit of this construction is that the bandwidth of the antenna is significantly increased and the overall size of the antenna is smaller.

G. **Prior Art:**

US 5434579: Inverted F antenna with non-contact feeding
US 5764190: Capacitively loaded PIFA
US 6680705: Capacitive feed integrated multi band antenna

H. Typically in PIFA there is ground everywhere underneath the antenna element. In this design it might be the case, but most likely some of the ground is removed.
Typically in PIFA the feed point and ground are physically close together. In this design, this is the case concerning the ground plane. However concerning to antenna element, the feed point is nearly the other end of the antenna element (high impedance point).
Because this arrangement the feed element does act also as a matching component. (A small capacitor parallel to high impedance can bring the real part of the impedance down -effect between the feed plate and ground.
The reactance of the feed capacitor -effect between feed plate and the antenna element- and the reactance of feed line are used to cancel the remaining reactance.) Of course an additional external matching circuit can be added.
The structure exhibits a rather long and thin slot to the antenna element, because the feed and ground connections are close each others, but still in opposite ends of the antenna element.